

Early Exposure to Child Maltreatment and Academic Outcomes

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Abstract

Early childhood trauma increases the risk of academic difficulties. The purpose of this study was to investigate the prevalence of early contact with child protection services (CPS) and to determine whether early exposure to maltreatment investigations was associated with important academic outcomes. The authors focused specifically on standardized test scores (math and reading), grade retention, and special education status in third grade. The sample was diverse and included all children born between 2000 and 2006 and enrolled in Michigan's public schools ($N = 732,838$). By the time these students reached third grade, approximately 18% were associated with a formal CPS investigation. In some school districts, more than 50% of third graders were associated with an investigation. African American and poor students were more likely to be investigated for maltreatment. Children associated with maltreatment investigations scored significantly lower on standardized math and reading tests, were more likely to be identified as needing special education, and were more likely to be held back at least one grade. These findings indicate that involvement with CPS is not an infrequent event in the lives of young children and that within some school districts, maltreatment investigations are the norm. Child welfare and educational systems must collaborate so that the early academic struggles experienced by victims of maltreatment do not mature into more complicated difficulties later in life.

Keywords

child maltreatment, education, investigation

There is an accumulating body of empirical evidence that has greatly advanced our understanding of the consequences of early childhood trauma on youth outcomes. Traumatic events include but are not limited to child maltreatment (e.g., neglect, physical abuse, and verbal abuse), exposure to physical or mental harm, life-threatening injuries, accidents, death of loved ones, and the witnessing of community violence or suffering of others (e.g., domestic violence and refugee of war; Gerrity & Folcarelli, 2008). Such events are considered traumatic when these life experiences surpass the child's ability to effectively cope (Gerrity & Folcarelli, 2008). Traumatic events may pose a threat to life, bodily security, or sanity and are often accompanied by feelings of fear, helplessness, or horror (Mongillo, Briggs-Gowan, Ford, & Carter, 2009).

The evidence suggests that infants, toddlers, and young children are not only more likely to experience trauma relative to other age-groups (Radford, Corral, Bradley, & Fisher, 2013 U.S. Department of Health and Human Services [USDHHS], 2017) but are more vulnerable to its effects and have a greater duration and severity of symptoms over the life course (Dunn, Nishimi, Powers, & Bradley, 2017; Ogle, Rubin, & Siegler, 2013). The experiences of trauma are consistently linked to a broad variety of negative life circumstances including poverty, juvenile delinquency, adult crime, low-academic achievement,

substance abuse, mental disorders, and poor health (Ballard, Van Eck, & Musci, 2015; Walsh, McLaughlin, Hamilton, & Keyes, 2017). The consequences of early childhood trauma have serious implications not only for the victims but also for the families, schools, communities, and policy makers which share the responsibility of care and supervision.

In the current study, we focus specifically on child maltreatment as the traumatic event. Although individual states have their own definition of maltreatment, federal guidelines as noted in the Child Abuse Prevention and Treatment Act (CAPTA, 42 U.S.C. §5101) and as amended by the CAPTA Reauthorization Act of 2010 (P.L. 111-320) help define conditions or behaviors that identify child abuse and neglect. In general, any act or failure to act on the part of a parent or

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caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation, or an act or failure to act, which presents an imminent risk of serious harm is considered maltreatment (USDHHS, 2017). The major categories of maltreatment include neglect, physical abuse, psychological maltreatment, and sexual abuse.

Specific to maltreatment, there is a small yet growing body of literature on educational experiences and outcomes of maltreated children and youth. This literature is important for both child welfare and educational systems as more than 70% of the half a million children in foster care are of school age (National Working Group on Foster Care and Education, 2008; Romano, Babchishin, Marquis, & Frechette, 2014; Snow, 2009; Trout, Hagaman, Casey, Reid, & Epstein, 2008; Trout, Nordness, Pierce, & Epstein, 2003). In terms of outcomes, maltreated children and children exposed to violence (in the home and in the community) often exhibit lower grade point averages and scores on standardized tests, frequent truancy, increased school mobility, grade retention, suspension, expulsion, and dropping out of school (Fry et al., 2018; Tessier, O'Higgins, & Flynn, 2018; Trout et al., 2008). Youth in foster care are especially vulnerable to long-term difficulties, as they are 4 times more likely to change schools during the school year, be held back a grade, and attend a low-performing school relative to their nonfoster care peers (Barrat & Berliner, 2013; Scherr, 2007). It is important to note that academic difficulties are not limited to the elementary or even high school years. Trauma and child maltreatment have long-term impacts including the disruption of academic aspirations throughout college (Morton, 2018).

Poverty and socioeconomic disparities also impact a student's school readiness and academic performance (Brooks-Gunn & Duncan, 1997; Lacour & Tislington, 2011). This is important, as poor families are vastly overrepresented in population served by child protection (Kim & Drake, 2018). Regardless of gender, race, or ethnicity, students from low-income families consistently score well below average in comparison to their more affluent peers (Bergeson, 2006) and are twice as likely to have other poorer outcomes throughout their education such as having to repeat a grade, being expelled, suspended, or ultimately dropping out of school (Brooks-Gunn & Duncan, 1997). Researchers have identified a variety of direct and indirect mechanisms through which poverty impacts children's academic readiness and performance (Duncan & Brooks-Gunn 1997; Engle & Black, 2008). Three of the most prominent perspectives center on the role of the home environment, brain development, and the limitations of attending low-socioeconomic status (SES) school systems.

At home, poor children often lack the financial, physical, and social resources they need to succeed academically. The home environment may lack educational materials and resources (e.g., books in the home, a computer, and a quiet study space) as well as academically supportive social relationships, such as parents, role models, or mentors (Brooks-Gunn & Duncan, 1997; Lacour & Tislington, 2011). With regard to brain development, children living in poverty are at an

increased risk of exposure to hazards (e.g., inadequate nutrition, substance abuse, trauma, and environmental toxins), all of which adversely affect brain development (Duncan & Brooks-Gunn, 1997; National Center for Children in Poverty, 1999; Parker, Greer, & Zuckerman, 1988). Finally, many low-SES schools lack adequate financial and instructional resources and are often plagued by lower teacher morale, higher attrition rates, poorer school and classroom climates, and other conflicting interpersonal factors that are all significant obstacles to academic success (Ferguson, Bovaird, & Mueller, 2007; Hopson & Lee, 2011; Schafft, 2006).

In the current study, we focus specifically on child maltreatment early in life for two reasons. First, young children have significantly higher rates of exposure to maltreatment when compared to other older children and adolescents. A recent study indicated that 37.4% of all children experience at least one child protection investigation of maltreatment within the first 18 years of life (Kim, Wildeman, Jonson-Reid, & Drake, 2017). Infants have the highest risk, experiencing maltreatment at a rate of 24.2 for every 1,000. The rates drop sharply for 1-year-olds (11.8 per 1,000) and then follow a decline between Years 2 (11.3 per 1,000) and 7 (9.6 per 1,000; USDHHS, 2017). Second, the focus of the current study is on early measures of academic success, and the earliest standardized measures available in public school data are captured at third grade. It is important to note that neglect accounts for approximately 75% of all maltreatment investigations (USDHHS, 2017). This is relevant to the current study because neglect (e.g., unsafe housing, inadequate supervision) is correlated with poverty and poverty is correlated with academic engagement and achievement.

The current study is guided by two specific research questions and makes three significant and unique contributions to the literature. First, what is the prevalence of formally investigated child maltreatment in the public school population by the time students reach third grade and do prevalence rates vary by school district? This is the first study that merges population-based administrative data to estimate the prevalence of early involvement with the child protection system (CPS) in the public school system. Although a small number of studies have explored the academic experiences of maltreated youth in public schools, these studies are limited to foster care populations (Wiegmann, Putnam-Hornstein, Barat, Magruder, & Needell, 2014), which account for only a fraction of the overall abused and neglected population. Of the 4.1 million children investigated nationally for maltreatment in the most recent reporting year, only 18% of all allegations were substantiated, and only 148,262 (less than 4% of all investigations) were removed and placed in foster care (USDHHS, 2017).

Second, what is the association between early contact with CPS and critical academic outcomes? The current study focuses specifically on standardized math and reading scores, grade retention, and special education status by third grade. These outcomes were selected because of their relative importance noted throughout the instructional and educational policy

literatures (Hocutt, 1996; Mathys, Veronneau, & Lecoca, 2017; Ravitch, 2016). This is the first study to use population data to measure the influence of maltreatment on early measures of academic success. We focus on the experiences of young children because recent findings on trauma and educational outcomes suggest that younger victims likely experience the greatest academic challenges (Romano et al., 2014). In terms of contributions to the literature, although there exists some work on child maltreatment and academic outcomes, these studies either focus on samples of youth transitioning to adulthood (Courtney & Hook, 2017; Okpych, Courtney, & Dennis, 2017) or are limited to samples of youth placed in foster care settings (Barrat & Berliner, 2013). Moreover, studies of maltreatment and academic outcomes often suffer from serious methodological limitations including inadequate comparison groups (or no comparison group), failure to control for poverty, and inability to estimate effects of substantiated and unsubstantiated reports of maltreatment. In the current study, we build on prior studies and address many of these noted limitations by investigating whether substantiated victims of maltreatment achieve significantly different academic outcomes as compared with similar children associated with unsubstantiated allegations of maltreatment or no allegations of maltreatment.

Method

Data

This study was approved by the institutional review board of the authors' affiliated institution. Data for this study come from three different sources: (1) the Michigan Department of Education (MDE), (2) the Michigan Department of Health and Human Services (MDHHS), and (3) the U.S. census.

The MDE provided education-related data on all cohorts of third-grade youth in Michigan public schools who were born between 2000 and 2006. These data included standardized test scores for math and reading, youth characteristics, and their school at the third grade. The MDHHS provided data on all youth in Michigan who were formally involved with child protective services (CPS). The study also included block-level data from the U.S. census to provide contextual data on the school characteristics and neighborhood characteristics for each student.

It should be noted that the MDE and MDHHS data are derived from two unique administrative data systems and do not have common unique identifiers that allow us to directly identify youth in Michigan public schools who were involved with CPS. Therefore, probabilistic matching was used to create the linkages. This procedure is described in further detail in the analytic plan of this report.

The study time frame for each youth was from birth to the completion of the third grade. Only a small number of youth had missing data (7.8%) on the study variables. Thus, the study team used listwise deletion, which resulted in a final sample size of 732,828.

Measurement

Academic outcomes. The primary outcome measures for this study were standardized math and reading scores, special education status, and grade repetition. Standardized math and reading scores were based on the Michigan Education Assessment Program (MEAP). The MEAP was administered to all youth in public schools in the third grade until the year 2015, at which point a new standardized assessment was introduced. We standardize scale scores to have a mean of 0 and standard deviation of 1 for each Grade \times Year \times Subject so that the scores are comparable even across different test administrations. A small percentage of youth (0.72%) repeated the third grade and, therefore, had multiple third-grade test scores. For these youth, only the first set of test scores is used in the analysis.

Special education services and grade repetition were included as binary variables in the analyses. Special education services are provided to students who are in need of academic and behavioral supports. Students qualify for these services based on individualized assessments conducted by a specialist within each school or district. The indicator for grade repetition indicates whether a student repeated kindergarten, first grade, or second grade.

Child protective service involvement. Data pertaining to child protective service (CPS) involvement come from data provided by the MDHHS ($N = 846,870$). *CPS involvement* refers to whether a student was formally investigated for based a complaint of abuse or neglect (or both) by the third grade. Investigations are initiated when a formal complaint with sufficient evidence is made to CPS by either a mandate reported or other concerned individual with firsthand information. In this study, we delineate whether the investigation was substantiated (substantiated vs. unsubstantiated investigation). Substantiation refers to whether CPS determined that a preponderance of evidence was found to support the complaint of abuse or neglect. Thus, the measure of CPS involvement is specified as having three mutually exclusive levels: (1) no investigation, (2) at least one investigation without substantiation but no investigation with substantiation, and (3) at least one investigation with substantiation.

Student, school, and neighborhood characteristics. The MDE data set included a range of variables to describe the sample and serve as control variables in statistical models (approximately 5.1 million records). These variables included *race*, *gender*, and *birth year*. The original race categories in the MDE included White, Black, Hispanic, Asian, American Indian, and Hawaiian. American Indians and Hawaiians were collapsed to a single category (Other) because of low-cell counts, giving rise to concerns of identifiability. The MDE also included data on whether the student qualified for the *free or reduced lunch* program (yes vs. no). This program is commonly used in educational research as an indicator of economic disadvantage. This program is administered by the National School Lunch Program, which provides free and reduced lunch prices to

students of families earning below 185% of the federal poverty line. *School of enrollment* from the MDE was also included in the current study, which was used in the multivariate analysis to adjust for clustering.

We also used data provided by MDE that indicates whether each school is located in an urban, suburban, or town/rural area. The block-level data from the U.S. census was obtained to provide neighborhood contextual data for each student. Specifically, we classify the neighborhood in which each student lives into one of the three poverty categories: greater than 10% of families living in poverty, between 5% and 10% of families living in poverty, and fewer than 5% of families living in poverty. The census data were also included as fixed effects in the multivariate analyses, which is described in the following analytic plan.

Analytic Plan

The analytic plan for the current study involved linking the three major data sources. We then conducted univariate and bivariate summaries to describe the sample and then performed a series of multivariate analyses to test the association between CPS involvement and the major outcomes. Given the study's large sample size, we present effect sizes for bivariate tests in addition to *p* values. Cramer's *V* (Cramer, 1946) is used to quantify bivariate relationships between categorical variables and can be interpreted in the same fashion as a correlation coefficient. Each of these procedures is summarized below.

Probabilistic matching. As the major data sources for this project are derived from separate systems of care, a common unique identifier does not exist that allows for direct linkages across the data sets. Thus, probabilistic matching procedures were used to create these linkages. This was performed using a set of Statistical Analysis System (SAS) routines implemented within the Link King program (Campbell, 2017). After minimizing the number of total cross-file comparisons through blocking, Link King uses a combination of deterministic and probabilistic methods to establish certainty levels for matched pairs.

In the present study, a match file of 846,870 individuals with child welfare/human services involvement was compared against approximately 5.1 million student records. In order to be compared, individuals were required to have been born between 1989 and 2012 (inclusive). The following fields were used during the linkage process: first name, last name, date of birth, and gender. Race was excluded from the match process due to inconsistency in recording practices across systems (e.g., Hispanic ethnicity was recorded as a possible value for race in one system, but not the other). Each of these fields was subject to standardization procedures, ensuring that minor variations in text-based fields would not contribute to false or missed matches (e.g., all text is converted to uppercase, trailing white space is deleted, and all punctuation characters removed), values for gender were standardized and that birth dates were represented uniformly.

Following file standardization and blocking, pairs are compared deterministically and probabilistically. Both approaches are used to establish a certainty level for each pair, which is presented on an ordinal scale: 1 (*definite match*), 2 (*very high certainty*), 3 (*high certainty*), 4 (*moderate to high*), 6 (*low to moderate, possible twins*), and 7 (*probabilistic maybe*). A match was established for 742,269 records (87.6%). Approximately 92% of matched pairs were classified as belonging to Levels 1 and 2 and were retained for analysis.

Estimation of effects of CPS involvement on academic performances. Multivariate linear regression was used to estimate the effects of CPS involvement on test scores. In these models, there is one observation per student. Separate models were specified for reading and math scores.

For the special education and grade retention outcomes, it was necessary to select a regression model that accounted for the binary nature of the dependent variable as well as the timing of outcome. Thus, we estimated a discrete time hazard model (also known as an event study or survival model) for these outcomes. For this analysis, the data are structured so that there is one observation for each Year \times Year in the sample, starting in Kindergarten and running up through third grade. We create two different data structures, one for each outcome. For the special education analysis, if a student received special education services in a given year, the outcome variable for that Student \times Year Observation is coded as 1. If not, it is coded as 0. Years after a student first receives special education services are dropped from the data set. Since students can repeat grades without receiving special education services, a child can appear more than 4 times in this analysis; however, each child will have at most one observation where the outcome has a value of 1. For the graded repetition analysis, if a student is required to repeat a grade in the following year, the outcome for the current year is coded as 1. Similarly, observations after the first-grade repetition are dropped from the data. For each observation, CPS involvement is coded to reflect a student's experience up to the current year. For example, the first-grade observation for a student will capture any investigations for the child that occurred from birth until just before the beginning of their first-grade year (August 31). For both the special education and the grade repetition analysis, race and gender controls are naturally time invariant, and while the student poverty indicator can vary over time, it typically does change over a short-time period so we use the poverty status as of Grade 3 to be consistent with our test score analysis. We would also like to note that our decision to select repetition of K, first grade, and second grade was to represent important developmental periods while maximizing the size of the birth cohort.

To account for other contextual factors, we included fixed effect indicators for each School \times Census Block.¹ These coefficients for the fixed effects are not substantively meaningful and, therefore, are not included in the tables. Each model accounted for school-level clustering using a Huber–White sandwich estimator. These statistical procedures were selected

Table 1. Description of Study Population and Comparison of Involvement With Child Protective Services.

Independent Variables	Overall Number of Students	CPS Involvement by Grade 3			Test Statistic
		No Involvement (%)	Unsubstantiated Investigation (%)	Substantiated Investigation (%)	
All students	732,828	82.37	11.27	6.36	$\chi^2 (df = 2) = 13.63^{**}, V = 0.00$
Gender					
Female	361,165	49.37	49.06	48.54	
Male	371,663	50.63	50.94	51.46	$\chi^2 (df = 8) = 0.00^{***}, V = 0.11$
Race					
White	503,221	70.85	58.92	57.74	
Black	142,402	16.78	31.30	32.78	
Hispanic	52,522	7.19	7.13	6.97	
Asian	25,611	4.07	0.96	0.56	
Other race	9,072	1.12	1.69	1.96	$\chi^2 (df = 2) = 0.00^{***}, V = 0.32$
Free lunch status					
Poor	377,519	44.03	84.95	89.26	
Nonpoor	355,309	55.97	15.05	10.74	$\chi^2 (df = 4) = 0.00^{***}, V = 0.08$
School characteristics					
Urban	136,536	17.62	26.90	30.43	
Suburban	331,023	49.10	39.61	33.87	$\chi^2 (df = 4) = 0.00^{***}, V = 0.13$
Town/rural	235,052	33.28	33.49	35.71	
Neighborhood characteristics					
Poor neighborhood	319,905	39.67	61.27	64.08	
Medium neighborhood	143,987	20.26	17.09	16.31	
Wealthier neighborhood	268,936	40.08	21.64	19.62	

Note. CPS = child protective service; V = Cramer's V.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2. Summary of Academic Outcomes by Involvement With Child Protective Services.

Independent Variables	All Students	CPS Involvement by Grade 3		
		No Involvement	Unsubstantiated Investigation	Substantiated Investigation
Number of observations	732,828	603,663	82,554	46,611
Number of investigations				
Mean	0.44	0	1.71	3.87
Standard deviation	1.34	0	1.25	2.93
Academic outcomes				
Standardized math score (mean)	0	0.1	-0.4	-0.5
Standardized reading score (mean)	0	0.1	-0.4	-0.4
Special education in third grade	13.00%	11.60%	19.10%	21.20%
Repeated kindergarten, first grade, or second grade	17.70%	15.60%	25.50%	30.40%

Note. The sample is a cross-section of third-grade students in Michigan public schools born between 2000 and 2006. If a student repeated third grade, only their first year is included. Observations missing information on student demographics, neighborhood characteristics, or test scores are excluded. A complaint is defined as a formal report of abuse/neglect to child protective services. Math and reading scores are from third grade and are standardized to be mean zero and standard deviation one within each school year.

to account for unmeasured heterogeneity and the nested structure of the data.

Results

Tables 1 and 2 summarize the prevalence of child maltreatment in our full sample and relevant subgroups. Approximately 17.7% third-grade students attending Michigan public schools had a formal investigation of abuse or neglect by the third grade

(see Table 1). Among these students, over one third (36.0%) of the investigations were substantiated, representing 6.4% of all third-grade students. CPS involvement varied considerably across all subgroups (Table 1). Consistent with prior literature, investigations for child maltreatment were notably higher for more disadvantaged subgroups. Nearly, 85% of children with an unsubstantiated investigation and 89% of children with a substantiated investigation were receiving free lunch, compared to only 44% of students with no involvement. Similarly,

those students coming from the poorest neighborhoods had high rates of involvement compared to neighborhoods of medium and high wealth. Under 20% of students with no CPS involvement were marked as attending an urban school, and under 40% were marked as living in poor neighborhoods. And Black students were roughly twice as common among children with an unsubstantiated investigation (31%) and substantiated investigations (33%), compared to children with no involvement (17%).

The average number of investigations per student was .44 (Table 2). Students with at least one substantiated investigation had an average of 3.87 investigations, while students who had at least one investigation but without any substantiation had an average of 1.71 investigations (Table 2). The most common type of maltreatment reported was neglect (83.8%), followed by physical abuse (21.9%), and sexual abuse (3.8%). The percentages exceed 100% because any given child can have more than one substantiated complaint—see Table 2 for further detail. Among students with an investigation but without a substantiated complaint, 80.8% were investigated for neglect, 38.5% for physical abuse, and 11.1% for sexual abuse.

The descriptive results shown in Table 2 indicate that students with investigations for neglect or abuse have worse academic outcomes than their peers with no documented maltreatment. Students with no CPS involvement scored slightly higher than the average for math (Z score = .11) and reading (Z score = .10) compared to those with unsubstantiated investigations (Z score = $-.4$ and $-.4$, respectively) and substantiated investigations (Z score = $-.5$ and $-.4$, respectively). Similar trends were observed for receipt of special education and grade repeat. Specifically, 11.6% of students with no involvement received special education services. However, among those with an investigation had significantly higher rates of service receipt (without substantiation = 19.1%, with substantiation, 21.2%). Students with CPS involvement were also significantly more likely to repeat a grade (without substantiation = 25.5%, with substantiation = 30.4%) than students without CPS involvement (15.6%).

Effects of CPS involvement on academic outcomes. To better understand the effects of CPS involvement on academic outcomes, a series of multivariate regression models were specified to control for potentially confounding variables including race, gender, and free/reduced lunch. Table 3 presents the results for standardized math and reading scores. Having an investigation without substantiation was associated with a lower math and reading scores ($-.15$ and $-.016$, respectively) compared to no involvement. Students with substantiated investigations scored even lower in math and reading ($-.19$ and $-.20$, respectively), even after controlling for student demographics and School \times Neighborhood Fixed Effects.

Table 4 presents results of the discrete time hazard models to examine the relationship between early child maltreatment and the likelihood of receiving special education services or repeating a grade. After controlling for student demographics and School \times Neighborhood Fixed Effects, we find that having

Table 3. Linear Regression Model Results for Third-Grade Test Scores.

Independent Variables	Math Score		Reading Score	
	B	95% CI	B	95% CI
Unadjusted				
Investigations				
No involvement	Ref	—	Ref	—
Unsubstantiated	-.50	[-.52, -.058]	-.47	[-.49, -.045]
Substantiated	-.56	[-.58, -.054]	-.53	[-.55, -.051]
Adjusted				
Investigations				
No involvement	Ref	—	Ref	—
Unsubstantiated	-.15	[-.17, -.13]	-.16	[-.18, -.14]
Substantiated	-.19	[-.21, -.17]	-.20	[-.22, -.18]
Sociodemographics				
Female	-.08	[-.08, -.08]	.16	[.16, .16]
Poor	-.29	[-.31, -.27]	-.28	[-.30, -.26]
White	Ref	—	Ref	—
Black	-.37	[-.39, -.35]	-.25	[-.27, -.23]
Hispanic	-.22	[-.24, -.20]	-.19	[-.21, -.17]
Asian	.29	[.25, .33]	.08	[.06, .10]
Other race	-.09	[-.11, -.07]	-.06	[-.10, -.02]
N	732,828		732,828	
R ²	.28		.24	
Mean for students who did not have an investigation before G3	.11		.10	

Note. All reported effects (B) are statistically significant ($p < .05$). Math and reading scores are standardized to be mean zero and standard deviation one within each school year. Poor is defined by free/reduced price lunch eligibility. The unadjusted results are from a regression of a standardized third-grade math or reading test score on an indicator for whether a student had only unsubstantiated complaints before third grade and an indicator for whether a student ever had a substantiated complaint before third grade. The reference category is students who did not have any complaint before third grade. The adjusted results include controls for gender, race (White is the omitted category), poverty, and birth cohort fixed effects and third-grade school by census block fixed effects. Standard errors are clustered at the third-grade school level. CI = confidence interval.

either an unsubstantiated or substantiated investigation is associated with significantly higher odds of receiving special education services (34% greater odds for unsubstantiated and 44% greater odds for substantiated).² Similarly, CPS investigations are associated with a greater likelihood of repeating a grade (32% greater odds for unsubstantiated and 40% greater odds for substantiated).³

Discussion

This is the first study to merge statewide child protection and public education data to better estimate the prevalence of early child maltreatment and to understand the association between early maltreatment and academic outcomes in elementary school. A central finding is the high rate at which public school students come into contact with the child protection system (CPS). Approximately 18% of all public school children were associated with at least one maltreatment investigation prior to

Table 4. Unadjusted and Adjusted Associations Between Involvement With Child Protective Services and Academic Outcomes.

Independent Variables	Special Education		Retained in Grade	
	OR	95% CI	OR	95% CI
Unadjusted				
Investigations				
No involvement	Ref	—	Ref	—
Unsubstantiated	1.56	[1.53, 1.59]	1.55	[1.51, 1.60]
Substantiated	1.71	[1.67, 1.75]	1.79	[1.73, 1.85]
Adjusted				
Investigations				
No involvement	Ref	—	Ref	—
Unsubstantiated	1.34	[1.30, 1.37]	1.32	[1.29, 1.36]
Substantiated	1.44	[1.39, 1.50]	1.40	[1.35, 1.45]
Sociodemographics				
Female	0.44	[0.43, 0.45]	0.58	[0.57, 0.59]
Poor	1.37	[1.33, 1.40]	1.09	[1.06, 1.13]
White	Ref	—	Ref	—
Black	0.96	[0.91, 1.00]	0.98	[0.94, 1.03]
Hispanic	0.84	[0.80, 0.88]	1.07	[1.02, 1.13]
Asian	0.62	[0.58, 0.67]	0.73	[0.67, 0.80]
Other race	1.12	[1.03, 1.22]	1.11	[1.02, 1.20]
N	1,269,632		1,048,385	
Pseudo R ²	0.05		0.17	
Mean for students who did not have an investigation before G3	0.12		0.16	

Note. Data are structured such that there is one Student \times Year Observation until either the outcome occurs (e.g., a student receives special education services or a student will repeat a grade the following year) or the student reaches Grade 3 without the outcome occurring. Poor is defined by free/reduced price lunch eligibility. The unadjusted results are from a regression of the outcome on an indicator for whether a student had only unsubstantiated complaints before the start of the academic year and an indicator for whether a student had any substantiated complaint before the start of the academic year. The adjusted results include controls for gender, race (White is the omitted category), and poverty, as well as birth cohort fixed effects, grade fixed effects, and third-grade school by census block fixed effects. Standard errors are clustered at the third-grade school level. OR = odds ratio; CI = confidence interval.

third grade, ranging from 1% to 59% across school districts. The take-home message is that involvement with CPS is not an infrequent event in the lives of young children and that within some school districts, maltreatment investigations are the norm. The estimates generated in the current study indicate that formal CPS investigations are more prevalent than child asthma (8.4%), child food allergies (7.6%), child disabilities (5.2%), and even the combined rate of child and adolescent obesity (17%) (Taylor-Black et al., 2014; Long et al., 2016; Ogden, Carroll, Kit, & Flegal, 2014; Sicherer, 2011). We believe this relative high rate of contact with CPS will be surprising to the general public, which is often misinformed about child abuse and neglect (Joyful Heart Foundation, 2011).

The perception that maltreatment is a relatively infrequent event and the general lack of knowledge about what constitutes maltreatment or what happens once maltreatment is reported is important for several reasons. First, problems that are perceived to be rare are often met with substantially limited and

most likely inadequate resources. States and even local communities are reluctant to divert significant financial resources toward problems that the vast majority of the population will never experience. Similarly, the perception of maltreatment as an infrequent event might limit the development of clinical technologies (i.e., innovative therapies) and policy-related responses. Third, when problems are perceived to be isolated, rare events or, out of the cultural norm, shame becomes a dominant emotion and the willingness to acknowledge or report such experiences is likely dampened. Such patterns of inhibited disclosure are observed in studies of domestic violence, especially in cases involving female perpetrators and male victims. Finally, greatly underestimating the rate of early child maltreatment likely has secondary consequences outside the immediate family as allied systems of care remain unprepared to work with a population of children that may be highly traumatized. This is certainly relevant to the public schools as one example of an allied system, as approximately 90% of students enroll in public education in the United States. How can schools adequately respond to large numbers of traumatized students if there is no mechanism for sharing information between child welfare and education or if the general perception is that the exposure to maltreatment is limited to a small group of students? A question remains—why do public schools dedicate considerable resources for some external factors that may impact learning but not others?

Consider the population of elementary school students that have food-related allergies. All schools are required to have a documented plan to care for these students. The rationale for such a plan is that food allergies, at minimum, can negatively interfere with a child's academic experience and at the extreme result in serious physical illness. MDE states in their policy manual that

to effectively manage food allergies and the risks associated with these conditions, school staff and parents must come together to develop a comprehensive Food Allergy Policy at the local school district level. This plan should include strategies and actions needed to manage food allergies in schools, and reinforce the efforts of each school to create a safe learning environment for all children. All staff members play a part in protecting the health and safety of children with chronic conditions. These staff members include administrators, secretarial support, school nurses, food service professionals, counselors, bus drivers, classroom and specialty teachers, athletic coaches, playground monitors, and field trip chaperones.

Food allergy policies make sense and more importantly they work to keep children safe and work to help children succeed in school (Shah, Parker, & Davis, 2013). Should public schools pursue a similar approach in terms of additional supports and services for abused and neglected children? Can public systems of care overcome privacy concerns with regard to sharing information as sensitive as maltreatment? What if the evidence clearly suggests that child maltreatment significantly impacts a student's success from a very early age? Might that provide a

compelling argument for information sharing and trauma-related educational programming?

With regard to school success, the findings in the current study clearly indicate that early involvement with CPS is associated with a range of negative academic outcomes. Central to these findings is that the effects of maltreatment appear quite early in the student's academic career. Specifically, by third grade (approximately 8 years of age), student associated with at least one maltreatment investigation were significantly more likely to be held back in first or second grade (15.6% no allegations, 25.5% unsubstantiated allegations, and 30.4% substantiated allegations). Moreover, students associated with at least one allegation of maltreatment scored significantly lower on third-grade standardized tests for both math and reading tests—approximately one half a standard deviation lower than the average third-grade student. Thus, on average, students with a history of child protection involvement score at approximately the 30th percentile. These effects remain even after controlling for a wide range of important covariates including race, gender, and poverty. So what can schools do to improve outcomes for students with a history of child abuse and neglect? The response requires legal, social, and programmatic considerations.

From the legal perspective, federal law (e.g., the Child Abuse Prevention and Treatment Act and the Adoption and Safe Families Act) is specifically designed to promote the safety, permanency, and well-being of maltreated children. As it relates to education, much of the language and emphasis on child abuse laws focus on public school teachers as mandated reporters. Michigan's Child Protection law requires educational professionals to notify the state if maltreatment is suspected (MCL 722.623(1)(a)0). Yet the federal law also provides guidance to states with regard to expectations subsequent to the reported allegation and judicial disposition. Child safety is clearly the paramount concern for child welfare system, but with the signing of the Adoption and Safe Families Act of 1997, states were required to develop policies and practices to support child well-being. The underlying rationale is that maltreated children deserve nurturing families and other environments in which their physical, emotional, social, and educational needs are met. "Other environments" and "educational needs" are key terms in this statement, as it relates to the responsibilities of public school systems. So how can schools and child welfare agencies best accomplish this requirement? The Individual Education Program is one approach that has proven effective. When students are suspected of having a disability that may interfere with their academic progress, a written request for a formal evaluation is made to district personnel. A multidisciplinary team conducts the initial evaluation and makes recommendations for services (generally) within 30 days.

A question remains as to what constitutes a disability as it relates to learning and classroom success? If a traumatic response to maltreatment significantly interferes with academic progress, yet there are no other signs of formally recognized learning disabilities, how can public schools best respond?

Should teachers have access to maltreatment histories? Clearly, there are serious legal concerns as they related to privacy and confidentiality. Yet there are also social concerns raised by the sharing of maltreatment histories with public school officials. First, not all maltreated youth experience academic difficulties and therefore there would be no advantage to disclosures of one's family history. Second, and perhaps more important in terms of harm or unintended consequence, is what would teachers do with such information? It is possible that knowledge about prior maltreatment might negatively shape how teachers perceive school readiness, student motivation, and overall intellectual capabilities. These negative perceptions in turn might impact important school behaviors or experiences including grading and disciplinary practices. Similar patterns of effects are observed in studies of teacher perceptions based on race, gender, and nation of origin (Okonofua & Eberhardt, 2015; Robinson-Cimpian, Lubienski, Ganley, & Copur-Gencturk, 2014). In short, there are legal issues and social implications to consider, but a more general programmatic response could be possible. Trauma-informed schools represent at least one option to better serve students that arrive in classrooms with a history of child abuse and neglect.

In response to both the high rates of trauma exposure and the understanding that trauma may interfere with learning and engagement, many schools have adopted a trauma-informed approach with students. According to the Substance Abuse and Mental Health Services Administration, a trauma-informed approach for children (1) recognizes the broad impact of trauma and understands potential paths for recovery; (2) recognizes the signs and symptoms of trauma in children; (3) responds by fully integrating knowledge about trauma into policies, procedures, and practices; and (4) proactively resists the traumatization of children and program staff. The treatment models are guided by the following six principles: safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice, and choice; and cultural, historical, and gender issues (Maynard, Farina, & Dell, 2017). With trauma-informed training at all levels, trauma-informed schools attempt to create environments that are responsive to the needs of traumatized students. Trauma-informed schools often modify policies (e.g., disciplinary practices) and offer a wider range of clinical services (both assessments and counseling) to help meet the unique needs of these populations. The proliferation of trauma informed schools is widespread. Unfortunately, in contrast with more established and well-defined trauma informed interventions (e.g., cognitive behavioral therapy), it is premature to make any conclusive arguments about the overall effectiveness of trauma informed schools. In a recent special issue, Overstreet and Chafouleas (2016) note that although the trauma informed approach may be promising, the evidence to date is limited by a reliance on uncontrolled, less rigorous evaluations. So, although this programmatic approach may be helpful to help victims of early maltreatment succeed in public schools, additional evidence is necessary. Considering the high rates of exposure to maltreatment early in life and the established relationship between trauma and critical academic

outcomes, rigorous investigations of trauma services, or a trauma-oriented approach in public school settings is a priority.

The focus of the current study was targeted toward understanding the relationship between early maltreatment and early academic outcomes, yet some important estimates emerged specific to child maltreatment, race, and poverty. Regarding race, African American students were significantly more likely to be retained at least one grade, more likely to be classified for special education and scored significantly lower on the standardized math and reading tests. The same pattern of effects was observed for poor students. More central to the focus of the current study, we find that the exposure to maltreatment and involvement with the child protection system was not randomly distributed throughout the public school population. Young children who were involved with the child protection system were more likely to be African American and more likely to be poor (as measured by the free and reduced lunch status). This is highly concerning, as the consequences of early maltreatment on critical school outcomes, and the potential lack of support services within the school districts, are disproportionately experienced by African American and poor elementary school students. Moreover, policies designed with the intention to improve long-term student outcomes (e.g., holding third graders back if they fail to achieve proficiency by third grade) may have the unintended consequence of seriously exacerbating racial and economic disparities in public schools.

The current study represents the first statewide analysis of early child maltreatment and early academic outcomes. Yet this study is not without limitation. Our method for identifying youth exposed to early maltreatment was limited to formal allegations with child protection. There exists some debate around formal reporting, self-reporting, and the overrepresentation of African American families involved with child welfare (Drake et al., 2011; Drake, Lee, & Jonson-Reid, 2009). Official reporting practices may capture a higher percentage of African American families. The current study also lacked any measures of services for maltreated youth in the school settings. It is possible that some school already offered specialized services for children associated with the child welfare system or a subpopulation within child welfare (e.g., youth in foster care). It would be important to know which schools offer such services and which students receive such services to better understand the association between child maltreatment, grade retention, and standardized test scores.

In closing, the findings indicate a high rate of exposure to maltreatment in public schools and there exists considerable variation between and within school districts. In some school districts, the majority of youth have a history with child protection prior to third grade. The findings clearly indicate that maltreatment is associated with grade retention and significantly lower scores in both math and reading. Given the importance of academic success in terms of career opportunities and economic self-sufficiency, if allied systems of care fail to collaborate on an innovative response, the early academic struggles experienced by maltreated youth will only mature into more complicated difficulties to be encountered later in life.

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Notes

1. To be consistent with our test score analyses, we use the student's school and census block in third grade in these models.
2. These effects are statistically different from each other (p value = .00).
3. These effects are statistically different from each other (p value = .00).

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